Volume 8 Number 1 March 1996

ISSN 1013-3445

CONTENTS

ASSESSING GENDER FACTOR IN SOME SECONDARY MATHEMATICS TEXTBOOKS IN NIGERIA

O.A. Oyedeji
Faculty of Education
Ogun State University
Igo-iwoye
Nigeria

ABSTRACT

The majority of girls in Nigeria no longer study Mathematics and the few who do continue to have averagely lower achievement scores than boys. Apart from the cognitive factors, which have been studied extensively, affective factors have been identified as contributing to the relatively poor performance of girls in Mathematics.

This study was therefore an attempt to investigate one of the affective factors, the factor of gender, in some secondary school Mathematics textbooks. Materials for the study included seven Mathematics textbooks that are commonly used in secondary school in Nigeria. The test items and illustrations in the textbooks were categorised as male-related, female-related, or neutral tasks. By using simple percentages and chi-square analysis, significant differences were observed on the number of items and illustrations that are male or female-related.

The results show that the textbooks contain high percentages of male-related tasks than female-related ones.

Introduction

An on-going argument in Nigerian educational circles concerns whether or not females are discriminated against in terms of educational opportunities (Ajibade, 1987; Odu, 1987; Doherty, 1985). Currently, smaller numbers of women go beyond secondary education, and less than

30% of the few receiving higher education are in Science or Mathematics related courses.

The majority of girls no longer study Mathematics, and, those who do continue to attain lower achievement scores than boys. In the second International Mathematics Study, Schildkamp-Kundiger (1982) documented the sex-related differences in Mathematics achievement in a wide range of countries of differing economic levels. In general, in most countries, girls drop Mathematics as early as possible, thereby eliminating themselves from many careers requiring a mathematical background.

Often, the lack of girls in Mathematics or Mathematics-related courses in secondary schools is attributed to cognitive differences between the sexes, and these have been extensively studied (Maccoby and Jacklin, 1975; Harnish et al., 1986; Chacko, 1981; Shuard, 1982). In an international study carried out by Harnish et al. (1986) in which data were collected in 17 countries, results showed that males tended to do better with spatial and numerical problems and females with verbal tasks. The differences, however, were not great. Even then, many other studies have failed to reveal significant cognitive differences at all (Fenuena, 1979; Oyedeji, 1982; Burton, 1979; Stamp, 1979).

The very low proportion of women in the applied sciences and Mathematics cannot be sensibly attributed to cognitive factors alone. Burton (1979) is probably correct in ascribing the lack of women in Mathematics-related courses, and the poor performance in the subject, to affective factors. The subject is seen to be masculine; so, girls who possess the necessary ability are put off from specialising in Mathematics. Unfortunately, many crucial decisions about career and subject choice are made in early adolescence when students are most sensitive to sex role stereotypes and girls will find it difficult to opt for Mathematics – a masculine subject.

Apart from the factor discussed above, teachers of Mathematics do not help the situation either. Studies (Fenuema, 1979; 1980; Gore & Roumagoux, 1983; Michaels, 1978) have shown that girls in secondary

schools in Britain face an additional problem in the differential treatments being given to them by teachers. While more attention and encouragement are always given to the boys, the teachers tend to neglect the girls. Other studies carried out in Britain (Becker, 1981; Michaels, 1978) showed differential treatment between boys and girls, on the cognitive level of questions posed by the teacher, in teacher's praise and criticism, and in the individual help given.

Many societies cling to the idea that Mathematics is a male domain. The attitudes of teachers, discussed above,are just a reflection of the attitude of the society at large.

Another important aspect which is the concern of the present study is the differential treatment observed in Mathematics textbooks. Various investigations have shown that many Mathematics textbooks contain materials that are sex-role stereotyping, such as showing males in active, professional situations and females in domestic, passive roles (Moris and Jacobson, 1985). Apart from this, many textbooks contain test items that are sex-role released tasks, and in most cases, in favour of males. All this strengthens the idea that Mathematics is a male domain, and not for girls. And so it has become.

The Problem of Study

In a number of countries, committees have been set up to investigate Mathematics and science textbooks for sex-role stereo-typing. This effort is a way of reducing differences of mathematical expectations between boys and girls. These investigations of Mathematics textbooks are here considered to be very necessary in Nigeria in order to eliminate any aspect of the materials that show or indicate bias against girls, especially when results of studies have shown that boys perform better than girls on male-related tasks, and girls perform better on female-related tasks (Ehindero, 1982).

The present study, therefore, attempted to investigate gender factor in seven common Mathematics textbooks in Nigerian secondary schools.

Specifically, the study is an attempt to find out whether the Mathematics textbooks treat boys and girls differently on the number and types of examples and illustrations, and the test items used as exercises for the studies.

Design and Procedure

Materials

The materials for the study included seven common Mathematics textbooks in secondary school in Nigeria (junior and senior secondary school). These are:

(1) *New General Mathematics for West Africa* by Channon et al. Books 1 to 5, represented by letters A to E.

(2) *Ordinary Level Mathematics* by Hardwook Clarke, JS and SS editions, represented by F and G.

Method

A content analysis of the seven textbooks was carried out. All the exercises and illustrations in the selected textbooks were considered in the study.

A format was prepared to indicate the status of each item or illustration in the texts, whether it is male-related, female-related, or neutral.

In order to determine whether an item is sex-role stereotyping, the wordings of the items are considered. All items starting with *man, boy(s), father* or containing the pronouns *he* or *his* or *him* are considered as male-related tasks. And all items using the word *woman, mother(s) girl(s)* or using the pronouns *her* or *she* are considered as female-related tasks. All items and illustrations that do not contain any of the above words or pronouns or that contain both (that is activities that involve both boys and girls together) are categorised as *neutral* or not biased.

By going through all the exercises and illustrations in each of the textbooks, the overall numbers of male-related, female-related, and neutral items for each textbooks were computed.

Analyses

Simple percentages were used to indicate the proportions of male-related, female-related, and neutral tasks in each of the selected textbooks. Also, chi-square (χ^2) analyses were carried out on the data to determine whether the differences observed in the proportions are statistically significant.

Results and Discussions

The percentages of male-related, female-related, and neutral tasks are presented in Table 1.

Table 1

Percentages of Male-Related, Female-Related and Neutral Items in the Selected Texts.

Text	Male-Related Items		Female-Related Items		Neutral Items		Total
A	N	% of Total	N	% of Total	N	% of Total	
A	125	19.50	31	4.84	465	75.66	641
B	176	21.95	28	3.49	598	74.56	802
C	119	18.14	37	5.64	500	76.22	656
D	291	24.12	27	3.39	577	72.49	796
E	121	18.28	26	3.93	515	77.79	662
F	268	19.06	33	2.35	1105	78.59	1406
G	109	20.49	51	9.48	372	70.03	532

Table 1 shows that high percentages of the items and illustrations are neutral items; that is, not related to any sex-role (with minimum percentages of 72.49). It is observed that the number of male-related items and illustrations are more than the female-related items in all the textbooks, with percentages of male-related tasks and illustrations ranging from 18.14 to 24.12. The highest percentage of female-related tasks and illustrations observed in the textbooks is 9.48 (textbooks G). One observes from the results presented in Table 1 that the textbooks (A-G), contain more male-related items than female-related items, though greater percentages of the items are not sex-role stereotyped (neutral). Therefore, the textbooks considered present Mathematics as more of a male domain subject. Most of the items that are male-related are observed to present men in engineering, big businesses, architecture, navigation, surveying, and piloting, while most of the items that are female-related showed women in the market or supermarkets or interacting with children at home.

Further analyses were carried out to find out whether the differences observed in the number of male and female-related items are statistically significant (Table 2).

Table 2

χ^2 Analyses of Male and Female-Related Items

Text	Male-Related		Female-Related		
	(N)	Items	(N)	Items	χ^2
A	125	(78)*	31	(78)	56.64
B	176	(102)	28	(102)	107.37
C	119	(78)	37	(78)	43.10
D	192	(109.5)	27	(109.5)	124.32
E	121	(73.5)	26	(73.5)	61.39
F	268	(150.5)	33	(150.5)	183.47
G	109	(80)	51	(80)	21.00

All significant beyond = 0.001

*Expected values in brackets

Results in Table 2 show that the differences observed on the number of male-related and female-related tasks and illustrations are all significant beyond $p < 0.001$. The textbooks are therefore biased against secondary school girls, though there are more neutral items.

The results here demonstrate cogently that the Nigerian government and national agencies approve and prepare textbooks in which female characters appear as sex-role victims and men routinely abuse and violently "beat" women. Despite the claim that "Mathematics is for all regardless of sex," the clear message here is that women are weak, and are capable only of cooking, petty trading, and home keeping.

Conclusion

Results of this study have shown that girls and boys are not equally treated by the selected Mathematics textbooks. Sex stereotyping is observed in the texts, and this is against the females.

Mathematics is regarded as essential and a service subject which an individual needs in dealing with the daily routines and the environment. The sex-role stereotyping that exists and that continues to persist in the teaching of the subject was not intentional. Every individual or organisation concerned with the teaching of the subject should therefore make conscious efforts to stop the obvious discrimination against girls in education.

There is need for positive change of attitude on the part of every citizen towards the education of girls. Necessary support needs to be given by all the determinants of our educational system — curriculum planners, schools, textbooks and materials publishers, and teachers to make campaign for women education worthwhile in order not to play them out of careers in science, Mathematics, and technology.

Frantic effort should be made by the various organs concerned in the educational system in Nigeria to see that sex-role stereotyping in textbooks and teaching materials is eliminated in order to improve the

girls' disadvantaged position in schools. In other words, the discrimination against girls in schools has to be checked.

It is the opinion of this researcher that a recent statement credited to one minister of education in Nigeria to lower the entry requirements for girls to higher institutions is not a right step in a right direction. First, the policy has a serious implication to women – that they are weak and cannot compete with men academically, and secondly, that implies discrimination against men. One would rather prefer taking appropriate and necessary action to arrest the situation from the root of the problem – that is, in curriculum planning, textbooks and curriculum material, and in the classrooms.

References

Ajibade, E.S. (1987, 24th - 28th February). Women education in Nigeria: The need for higher premium. Paper presented at the *9th Annual Conference of Educational Studies Association of Nigeria* (ESAN) held at the University of Calabar, Nigeria.

Becker, J.R. (1981). Differential treatment of females and males in mathematics classes. *Journal for Research in Mathematics Education, 12* (1), 40-53.

Burton, G. (1979). Regardless of sex. *Mathematics Teacher, 69*, 261-270.

Chacko, I. (1981). *Learning outcomes in secondary school mathematics as related to teacher and student characteristics*. Unpublished doctoral thesis, University of Ibadan, Nigeria.

Doherty, R. (1985). Education and employment: What's gone wrong? *International Review of Education, 31* (4), 465-467.

Ehindero, O.J. (1982). Correlates of sex-related differences in logical reasoning. *Journal of Research Science Teaching, 19* (7), 553-557.

Fenuema, E. (1979). Women and girls in maths: Equity in mathematics education. In *The teaching of basic science and mathematics*. Paris: Unesco Publications, 47-57.

Fenuema, E. (1980). Teachers and sex bias in mathematics. *The Mathematics Teacher, 73*, 169-173.

Gore, D. and Roumagoux, D.V. (1983). Wait-time as a variable in sex-related differences during 4th grade maths instruction. *Journal of Education Research, 26* (5), 273-275.

Harnish, D.L. et al., (1986). Cross-national differences in mathematics: Attitude and achievement among 17-year olds. *International Journal of Educational Development,* 6 (4), 233-244.

Maccoby, E.M. and Jackling, C.N. (1975). *The psychology of sex differences*. Oxford: Oxford University Press.

Michaels, J.W. (1978). Effects of differential rewarding and sex on mathematics performance. *Journal of Educational Psychology, 70,* 565-573.

Moris, R. and Jacobson. (Eds.) (1985). Reducing differences of mathematical expectations between boys an girls. In *The teaching of basic sciences and mathematics*. Paris: Unesco Publications , 47-57.

Odu, D.B. (1987). Social differentiation in access to educational opportunities: A break on development. Paper presented at the *8th Annual Conference of the Educational Studies Association of Nigeria,* (ESAN) 25th-28th February, 1986 at Unilorin, Nigeria.

Oyedeji, O.A. (1982). *Construction, validation and use of formative test in form two secondary mathematics.* Unpublished master's thesis, University of Ibadan, Nigeria.

Schildkamp-Kundiger, E. (1982). An international review of gender and mathematics. In *The teaching of basic sciences and mathematics.* Paris: Unesco Publications, 47-57.

Shuard, H. (1982). Differences in mathematical performance between boys and girls. In *The teaching of basic science and mathematics*. Paris: Unesco Publications, 47-57.

Stamp. P. (1979). Girls and mathematics: Parental variables. *British Journal of Educational Psychology, 49,* 39-50.